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ABSTRACT

A study examined the ability of third, fourth, and sixth grade students to use spellings to arrive at the pronunciations of unknown words. A test of 29 pseudo words was developed. Pseudo words were chosen because they eliminate familiarity with a word in its spoken form and contextual cues as sources of help in decoding. At the start of the test, the 184 subjects from two schools (A and B) were told of the examiner's interest in seeing whether they could pronounce made-up words by using their spellings. Pronunciations for each word, as well as explanations offered for how a subject pronounced three of twelve preselected words were recorded. Results indicated a mean score of 12.2 words correctly pronounced. Eighteen of the 29 pseudo words were mispronounced more than 50% of the time. Third grade students at school A had slightly higher scores than their counterparts at school B, while fourth and sixth grade students at school B had higher scores than their peers at school A. Test scores improved slightly more between third and fourth grades than between fourth and sixth grades. There was little evidence that subjects had been taught to scan the whole word before considering its parts, or that subjects understood the significance of syllabication. There were also problems with blending sounds to produce syllables or words, all of which suggest a need for better (rather than more) phonics instruction. (Descriptions of the two schools, students' explanations for pronunciations, and extensive tables of data are included.) (HTH)

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CENTER FOR THE STUDY OF READING

Reading Education Report No. 49

THE DECODING ABILITY OF ELEMENTARY SCHOOL STUDENTS

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May 1984

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The Decoding Ability of Elementary School Students

Detailed knowledge of the field of reading is not a prerequisite for concluding that what is popular to study and write about is often cyclical in nature. It is even more important to realize that shifts in interest rarely have anything to do with evidence that problems related to some aspect of reading have been solved, indicating it is time to move on to something else.

Exemplifying both the cycles and the fact that resolved problems do not always explain them is the current interest in comprehension compared to the scant attention being paid to phonics--a very popular topic not too long ago. Anyone who believes that evidence that children are expert decoders is the reason for the shift in interests needs only to review the research on phonics to learn that this is hardly the case.[1]

Brief Review of Phonics Research

What is both interesting and surprising about the large number of phonics studies done in past decades is that very few deal directly with decoding ability. Instead, most focus on one of two questions: (1) Does the use of whole word methodology or of phonics at the beginning lead to higher scores on reading achievement tests, and (2) Is deductive or inductive phonics instruction associated with higher scores? In practically all such studies, the assessment of reading ability occurred as early

as the end of first or second grade (Chall, 1967) and revealed nothing directly or specifically about children's ability to use phonics with unknown words.

In more recent years, a few researchers have tried to learn about decoding ability (e.g., Beachowicz, Camille, McCarthy, Ogle, 1979; Calfee, Venezky, & Chapman, 1969; Johnson, 1970; Rosso & Emans, 1981; Ryder, 1982; Tovey, D. R., 1980). In all cases, however, the studies are flawed by small numbers of subjects and/or by the limited amount of phonics content tested. The frequently mentioned study by Calfee et al. (1969), for example, used a 40-item pseudo word test but the items covered only the CVe pattern, the two common sounds for c and for s, seven vowel digraphs, and three consonant digraphs.

Researchers at the Learning Research and Development Center (University of Pittsburgh) have also been reporting studies of decoding; however, decoding in this research is equated with word recognition, not with the use of letter-sound relationships to attain that end. In one study (Hogaboam & Perfetti, 1978), subjects were even told not to try to sound out words that figured in a test "since the words would disappear (from the screen) as soon as they started" (p. 719). An underlying concern of the University of Pittsburgh research lies with vocalization latency (elapsed time between presentation of a word and subject's response) and, related to that, with possible ways to help students identify words quickly. The thrust behind the

studies lies not with decoding per se--no matter how it is defined--but with the fact that "those who score low on various reading measures that stress comprehension are almost always slow in accessing individual words" (Lesgold & Resnick, 1981, p. 3). These studies, therefore, reflect the current interest in comprehension, not a return to an interest in phonics.

The Present Study

The research to be reported here is concerned with phonics, specifically with the ability of third-, fourth-, and sixth-grade students to use spellings to arrive at the pronunciations of unknown words. This focus was selected for study because even though a sizeable amount of time in primary grade classrooms--sometimes even in kindergartens--is spent teaching phonics, what the instruction is accomplishing is unknown. That what is being achieved ought to be known is bound up with the fact that children have to be able to identify unfamiliar words if they are to succeed in comprehending connected text. Since not all such words appear in helpful contexts, the need to use spellings to achieve identifications exists.

The instrument used to evaluate decoding ability will be discussed first, after which the subjects and the schools they attended will be described.

Assessment Instrument

Because an examination of available phonics tests by this writer and others (e.g., Johnson, et al., 1980; Pikulski &

Shanahan, 1980) revealed serious flaws--for instance, limited content, tasks that relate to spelling rather than to reading, multiple-choice formats that allow for guessing--a decision was made to construct a new test for the study. Preparations thus required answers to the following questions:

1. Should test items be real words or pseudo words?
2. Should the assessment instrument be group-administered or given individually?
3. If administered to individuals, should subjects' responses be timed?
4. What phonics content should be used for developing test items?
5. From what grade levels should subjects be chosen?

Initial Decisions about the Test

The purpose of the research required that test items be single words rather than connected text. To ensure that the words were unfamiliar, and, second, to allow for use of the same items with subjects at different grade levels, another decision was to use pseudo words rather than real words even though with the use of the former, "the examinee is deprived of the opportunity to match the arrived at pronunciation for a test word with a word that is a part of his or her vocabulary" (Pikulski & Shanahan, 1980). The use of pseudo words also meant that only "allowable sequences" of letters could be used to develop them (Venezky, 1967). This meant that a test word might have oe in a

syllable but not ae. Or, to cite another restriction, a pseudo word could end in ve or ue but not in v or u.

Individual vs. Group Test

Those who have given careful attention to the most valid way to assess decoding ability (e.g., Adams, et al., 1980; Johnson, et al., 1980) agree that the best test consists of oral productive tasks. As Johnson and his colleagues point out, "The ideal phonics test would require the child to read aloud, while the experimenter would record all pronunciation errors . . ." (p. 12). Since group-administered tests prohibit oral responses, one further decision was to use an individually-administered instrument. While this allows for timing subjects' responses, that opportunity was bypassed even though studies have demonstrated (e.g., Adams, et al., 1980; Hogaboam & Perfetti, 1978; Perfetti & Hogaboam, 1975) that skilled readers have shorter vocalization latencies than less successful ones. The reason for this decision had to do with the goal of the testing: to learn about decoding ability when as much time as the reader needs is allowed. Such a goal is different--and has different implications for instructional programs--from one concerned with speed.

Scope of the Test

When improving instruction is the concern, the letter-sound correspondences and generalizations that figure in developing pseudo words ought to match what was taught. Adhering to that

principle was not possible, however, for two reasons. First, classroom observations were not part of the study, which meant that what had been taught was unknown. And, second, commercially-prepared materials are anything but uniform in the phonics content that they teach. To illustrate, one examination of five widely used basal reader programs with copyright dates ranging from 1979 to 1982 (Sorenson, undated manuscript) disclosed that a total of 42 phonic generalizations were in all the programs combined, yet only seven were taught in three or more of the series. Since consensus about what ought to be taught is not found in reading methodology textbooks either, it was decided to use content for developing the pseudo words that this writer considers to be both helpful and sufficient if, first, it is viewed as providing a starting point in the decoding process (rather than as yielding inevitably correct pronunciations), and, second, it is taught in conjunction with strategies for trying alternate sounds when what a generalization suggests fails to produce a recognizable word.[2] Table 1 lists the selected content; comments about the assumptions on which it is based follow.

Insert Table 1 about here.

One assumption is that phonics is meant to help with root words. (A corollary assumption is that affixes should be taught

as meaning-bearing units with attention going both to how they are pronounced and to how they affect the meaning or grammatical function of roots.) Another assumption underlying the content listed in Table 1 is that syllables are the unit for decoding, which means that children should know how to use the information about syllabication that the spelling of an unknown root supplies.

One further assumption is that variability in English words insofar as stressed syllables are concerned is so great as to make it pointless to teach generalizations about stress, which accounts for their absence in Table 1. (Acceptance of this assumption means that children would be taught to stress each decoded syllable until something "clicked"--that is, until a recognizable word resulted.) The implication of the last assumption for the present study is that stressing any syllable in a polysyllabic pseudo word was acceptable. Use of the schwa sound in unstressed syllables was acceptable, too.

Another facet of decoding not directly accounted for in Table 1 is what may sometimes be required: blending sounds to produce syllables. The omission is not meant to deny that blending would figure in decoding the pseudo words. Nor does the failure of the content in Table 1 to account for substituting and adding sounds to achieve a pronunciation either minimize the value of those processes for decoding or overlook their possible use by subjects.

Test Items

Since pseudo words were to serve as test items, the spelling and pronunciation of each had to match in a way that the content summarized in Table 1 would predict. This requirement is bound up with the fact that it is not only a reader's ability to use phonics but also his or her familiarity with a word in its spoken form (plus contextual cues) that allows for decoding a real word in which a direct match between spelling and pronunciation is not found. Since the use of pseudo words automatically eliminates two of the three sources of help (oral vocabularies and contexts), they had to be regularly spelled.

Initially, 38 pseudo words were developed which exemplified the syllable and letter-sound patterns referred to in Table 1. Variations of the list of words were used on a trial basis with 32 children in grades 3-6 who had been recruited by parents, friends of parents, aunts, and neighbors. They attended a variety of schools in three cities. Since 38 test items seemed excessive for the children who did poorly, the number was eventually reduced to 29 words, which covered the same content. They are listed in Table 2 in the order in which they were shown to the subjects. (Each word was typed in lower-case letters on a 3" x 5" card.) Words that commonly caused problems in the pilot study were scattered throughout the 29 items for the purpose of minimizing discouragement and fostering persistence. Acceptable responses are shown in Table 2 in ways that should clarify what

was considered to be correct. The acceptance of certain variations in pronunciations should be noted.

Insert Table 2 about here.

Subjects

It had been decided from the outset that subjects would be sixth, fourth, and third graders and that they would be tested in that order. The two decisions were related to an earlier study of basal manuals (Durkin, 1981a) that showed generous coverage of phonics in the primary grades but very little thereafter. This suggested that third graders tested as close as possible to the end of the school year could be viewed as students who had just received the last of concentrated efforts to teach phonics, whereas fourth graders would represent students who had had a year to use what had been taught in the not too distant past. Test scores of sixth graders could illustrate decoding ability at the end of elementary school.

Originally, the testing was to be part of a school system's large-scale effort to collect diagnostic information for improving instructional decisions. The plan was cancelled, however, because of unexpected budgetary problems. One consequence was that only one class at each of the three grade levels (amounting to 68 subjects) was allowed to participate in the study. They attended what will be referred to as School A.

Although the use of an individually-administered instrument placed limits on the number that could be tested, 68 subjects from one school seemed too small to allow for conclusions worthy of serious consideration. Consequently, permission was sought and granted to include all the third, fourth, and sixth graders attending an elementary school in another district. In what will be referred to as School B, the third graders numbered 33 children; the fourth graders, 38; and the sixth graders, 45. Altogether, then, 184 students constituted the research population.

In order to have some estimate of the subjects' reading ability, one other decision was to use the scores they achieved on standardized reading tests to approximate it. The tests that School A and School B administered during the period of time in which the pseudo word test was being given will be described later.

Pseudo Word Test Administration

The pseudo word testing, which began with the sixth graders in March and ended in May with the third graders, was done by this writer and three assistants. At the start of each test, subjects were told of the examiner's interest in seeing whether they could pronounce made up words by using their spellings. (Care was taken to make sure that all understood that the words were not real.) Yirf and morfac served as practice words to specify the nature of the task. A tape recorder was then turned

on with the explanation that it was easier for the examiner to listen to responses than to write them. The subjects were also told that they could take as much time as they wished with each word.

As soon as possible, the examiners listened to the tapes in order to tally the number of correct responses and to record erroneous ones. Recording procedures, which had been practiced and checked in the pilot study, were similar to those used for Table 2.

Also noted for each subject were the explanations offered for how he or she pronounced three preselected words. Requests for explanations were related to the fact that the testing was done not only to see whether subjects could use spellings to achieve pronunciations but also to learn about the processes involved in attaining that end. To realize the latter goal, each of the four examiners was assigned three different words for which explanations of pronunciations were requested with the questions, "Why do you think it says that? How did you decide it says _____?" The 12 selected words were chosen on the basis of findings in the pilot study:

1. Subjects tended to respond to test items either immediately or with considerable hesitation. Quick responses were correct more often than the others.
2. When subjects were asked to explain a pronunciation, the words that caused problems yielded more detailed

(but not necessarily correct) explanations than did the words that were pronounced quickly. With the latter, explanations were often as uninformative as, "I don't know. I just think it says that."

Based on the above findings, questioning subjects about words that were apt to cause problems seemed like the most productive procedure to follow, given the interest in learning about decoding processes. On the assumption that the words that were difficult in the pilot study might continue to cause problems, the 12 words missed most often in that earlier study were those about which questions were posed. The 12 words follow:

cef	gik	naubircude	vipho
cuxot	gysan	thorge	ximdle
dilque	judkeeve	tylm	yanse

Findings: Total Group of Subjects

Scores achieved by the 184 subjects on the pseudo word test are summarized in Table 3. A one-way analysis of variance indicated that the mean scores for boys and girls were not significantly different ($F = .042$).

Insert Table 3 about here.

The next table, Table 4, lists the percent of correct responses to each word. As this table shows, 18 of the 29 pseudo words were mispronounced more than 50% of the time. The 18 included all of the words about which the test examiners posed questions, plus hoyk, gebthor, quawz, zalnire, thoipder, and ciftaung.

Insert Table 4 about here.

Findings: By Grade Level

Performance on the pseudo word test by grade level is summarized in Table 5. To learn whether mean scores for the three grades differed significantly, a one-way analysis of variance was done. The F-ratio was 15.287, which is significant beyond the .001 level. To compare each pair of scores, the Newman-Keuls test was used. Results showed that all possible pairs of mean scores were significantly different at the .05 level of confidence. One fact about the data in Table 5 that needs to be kept in mind is that slightly more improvement in test scores occurred between third and fourth grades than between fourth and sixth. What also needs to be remembered is that what is being reported is not a longitudinal study, which would allow for much more meaningful data about developmental trends in decoding ability.

Insert Table 5 about here.

As was done earlier for the total group of subjects, the percent of correct responses to each pseudo word was calculated for each grade. Results comprise Table 6, where the words are listed in relation to the frequency with which third graders pronounced them correctly. Words that were mispronounced at each of the three grade levels one-half the time or more and that were mispronounced equally often by the total group of 184 subjects are listed below.

cef*	gebthor	naubircude*	vipho
ciftaung	gik*	thoipder	ximdle*
cuxot*	gysan*	thorge*	
dilque*	judkeeve*	tylm*	

The eleven starred words were among the 12 about which the test examiners posed questions. (The twelfth word was yanse.)

Insert Table 6 about here.

Findings: By School

Before test data for each school are reported, the schools and the reading tests they administered will be described.

School A

School A is in a city with a population of 35,000. Since only one class at each of the three selected grade levels participated in the research, it is pertinent to note that all classrooms in the school are heterogenously organized and self-contained. One sixth-grade student was omitted from the pseudo word testing--thus from the study--because he was absent on the three occasions when an examiner went to test him.

Teachers in School A, like all other faculty members in the system, are permitted to use any basal series to teach reading. They can also supplement a basal program with other materials.

The standardized achievement test administered by School A in March of the year of the study was the CTBS Comprehensive Tests of Basic Skills (1973). Two multiple-choice subtests (Comprehension and Vocabulary) make up the reading section. Level 1, Form S was used with the third graders, while Level 2, Form S was administered to both the fourth and sixth graders. The Vocabulary subtest at both levels is composed of 40 items. The last item in Level 1 requires selecting from blinking, dreaming, heavy, and sleepy the meaning of drowsy in the context drowsy in the heat. The final item in the Vocabulary subtest at Level 2 presents the context punctual arrival (with punctual underscored); the task is to select a synonym for punctual from a list made up of early, prepared, prompt, and unexpected. The Comprehension subtest at both levels has 45 items. It is

composed of brief passages followed by questions, each of which is followed by four possible answers.

Results of the testing for the subjects in School A are summarized in Table 7.

Insert Table 7 about here.

School B

School B is in a city with a population of 4,500. There are three public elementary schools. All the third, fourth, and sixth graders in one participated in the research.

By faculty choice, the Houghton Mifflin Basal Series (Durr, et al., 1981) has been used in School B since 1972. Like the teachers in School A, those in School B are permitted to supplement this basal program with other materials.

The Stanford Achievement Test (Gardner, et al., 1981) was given in April during the year of the research. Third graders received the Primary 3, Form E test, fourth graders took the Intermediate 1, Form E version, while the sixth graders were given the Intermediate 2, Form E test. Unlike the standardized test used by School A, the reading section of the Stanford Achievement Test is composed of Comprehension and Word Study Skills subtests. The format of the Comprehension test is similar to that in the CTBS test; there are 60 items, however, rather than 45. The Word Study Skills section, also made up of 60

items, is a multiple-choice test divided equally between two tasks. In the first, a word is divided into syllables in four different ways; the job is to choose which division is correct. For the second task, a word is printed (e.g., shine) and one word is to be chosen from three (chin, motion, slice) that includes the sound(s) recorded by the underlined letter(s) in the target word.

The performance of subjects in School B on the reading test is summarized in Table 8. The number of subjects in the various groups listed in that table has been omitted for the following reasons. Two subjects in grade 3 and two in grade 6 did not take the achievement test. In addition, two subjects in grade 4 and eight in grade 6 received raw scores that were sufficiently high as not to be assigned a grade-equivalent score. Since test results for School B did not become available until after the school year ended, it was impossible to administer tests to the absentees and more difficult tests to those with the highest raw scores. That the best readers in grades 4 and 6 (insofar as performance on the test is concerned) are not accounted for in the data about grade-equivalent scores in Table 8 needs to be kept in mind.

Insert Table 8 about here.

Performance on Pseudo Word Test

Results of the pseudo word test for School A and for School B can be compared in the next table, Table 9. A one-way analysis of variance for the data from School A indicated that differences in mean scores at the three grade levels are not significantly different (F-ratio = 1.544). In School B, on the other hand, they are (F-ratio = 15.138; $p < .001$). Results of the Newman-Keuls test indicated that all pairs of mean scores for School B differ significantly from each other at the .05 level of confidence.

Insert Table 9 about here.

The next table, Table 10, shows the percentage of correct responses to each pseudo word for each school. Since all previous ways of presenting percentages of correct responses pointed up consistent problems with certain words, finding the same pattern in the data for the two schools is not unexpected.

Insert Table 10 about here.

Correlation coefficients for pseudo word test scores and standardized test raw scores for both schools turned out to be statistically significant beyond the .01 level of confidence. (The coefficient for School A was 0.55; for School B, it was

0.57). Because of the interest in abilities at different grade levels, Table 11 summarizes correlation data by grade level.[3] Why two of the three coefficients for the third graders in School B are so markedly different from all the others has no obvious explanation.

Insert Table 11 about here.

Discussion

Standards for evaluating in some objective way the performance of the 184 subjects on the 29-item pseudo word test do not exist, because of the paucity and limitations of existing studies of decoding. Subjectively, the scores seem low whether looked at as a whole or divided by grade level or by the schools that the subjects attended. (Not to be forgotten is that if time limits had been placed on responding, scores might be considerably lower.) Reasons for a less than enthusiastic response to the achieved scores is graphically portrayed in Figure 1, where it can be seen that even the most successful subgroup of subjects (sixth graders in School B) had a mean score of only 15.4. (The standard deviation for these 45 students was 5.6; the range of scores, 6-26.)

Insert Figure 1 about here.

A number of factors could account for the low scores, including ineffective phonics instruction. However, since neither what was taught nor how it was taught is known, only the assessment instrument will be considered since flaws in that (and in instruction) are the two most logical reasons why the subjects did not do better than they did.

Assessment Instrument

One predictable concern about the assessment instrument is its use of pseudo words. As was explained earlier, pseudo rather than real words were selected both to ensure that the test items would be unknown and to allow for the use of the same words with all subjects. To assemble a list of real words that would meet the two criteria just mentioned (and also cover the phonics content listed in Table 1) would require considerable testing, thus more time than any school was likely to allow. Even if such a list of real words could have been compiled, some probably would be "unreal" for some subjects in the sense that they would not be in their oral vocabulary. These students would be at a disadvantage not shared by other subjects, given the help that oral vocabularies provide with the decoding process.

A second predictable criticism of the assessment instrument is that the development of test items was based on generalizations that, in certain cases, do not have what some would consider sufficiently high utility to serve as the basis for a decoding test. Actually, if generalizations were

restricted to what always produces an exactly correct pronunciation, their number would be small indeed. Since, as was mentioned before, consensus about what is sufficiently useful to be taught does not exist, the content used to develop the 29 pseudo words seems as defensible as any other group of generalizations.

Because the data that have been reported indicate that certain words consistently caused problems for a large number of subjects, another shortcoming that might be attributed to the test is the equal value assigned to each word in arriving at a total score. While it is reasonable to conclude that polysyllabic words are generally more difficult to decode than short, monosyllabic words if only because there is more to remember as the decoding process proceeds, it is equally true that one and the same word may be easy for one reader and difficult for another. Variations in what had been taught would be one reason for the difference; but there are other reasons, too. Take the pseudo word wobe as an illustration. One subject may have immediately noticed its relationship to a known word (robe), substituted /w/ for /r/, and arrived at the pronunciation of wobe both quickly and easily. Another subject, who also knew robe, may not have recalled it at the time wobe was shown, thus went about decoding it letter by letter and sound by sound. Since the test was not timed, the second child was not penalized for making the task more difficult than it needed to be.

Nonetheless, the hypothetical procedures that the two subjects used do show that difficulty is not as objective as it may at first appear to be. All this is to say that it would be impossible to arrive at a hierarchy of difficulty for the 29 pseudo words and then assign points accordingly.

The hypothetical description of how two subjects went about decoding wobe may have raised still another question about the test, namely, that it did not necessarily assess the subjects' ability to use the selected generalizations--assuming that they knew them, which, based on the data collected, is not likely to be the case for some. As was acknowledged early in the report, it was never thought that only the generalizations would figure in the decoding processes used by the subjects. Actually, what any decoder uses--whether with real or pseudo words--will vary from word to word depending on what words are in the decoder's reading vocabulary, on what can be recalled about what is known that will be helpful, and--in the case of real words--on the availability of contextual help. It was to try to find out what the subjects did do and use with the pseudo words that examiners asked questions about 12 preselected words. What the questions revealed will be reported later.

Now let me consider two further questions that might be raised about the assessment instrument. One is that it did not provide enough opportunities to apply a generalization, thus making it impossible to arrive at reliable conclusions about the

subjects' ability to use it. To be more specific, the generalization that c followed by e, i, or y suggests the soft sound for c applied to just three test words: rincy, cef, and ciftaung. While insufficient chances to use the content of selected generalizations is a valid criticism, anyone interested in assessing decoding ability must choose one of two possibilities, particularly when the assessment instrument is used with individuals: (1) Test a small amount of content with a sizeable number of words, or (2) test more content but with fewer words for each part. Given the underlying purpose of the research, it was decided from the outset to choose the second alternative.

Because the interest was in collecting data on students' decoding ability when they are allowed as much time as they need, time restrictions for responding were not used during the testing, which some may think is another flaw for two reasons. First, it does not allow for making distinctions between decoding procedures like those described earlier for wobe; and, second, it fails to recognize that what contributes to comprehension is decoding that is accurate and fast. However, since children can hardly use quickly what they do not know, an attempt to find out what is known seems basically important, especially because of the few studies of decoding ability that have been reported.

Having dealt with questions likely to be raised about the assessment instrument, let me continue the discussion of the data reported earlier.

Frequently Missed Words

As was reported, one reason why achieved scores on the decoding test were no higher than they were lies in the fact that 14 words were mispronounced half the time or more no matter how the scores were organized or divided. The 14 are shown below.

cef	gebthor	naubircude	vipho
ciftaung	gik	thoipder	ximdle
cuxot	gysan	thorge	
dilque	judkeeve	tylm	

Why did these 14 words cause problems? One reason is that both c and g were commonly assigned their "hard" sounds, regardless of the graphemic environment in which they occurred. In the Calfee, Venezky, and Chapman study (1969), similar findings for c were found--g was not tested in the brief amount of content assessed. These researchers attribute their subjects' common errors with c to a "response bias" for /k/ because of the frequency with which c pronounced /k/ appears in English words.[4]

English words did not appear to have much influence on what subjects in the present study did with dilque because in all the mispronunciations, que (pronounced "ku") was the second syllable in what is a monosyllabic word. While real words ending with que are hardly common, they do appear in materials that children see

in and out of school—for instance, antique, unique, technique, clique, and plaque, the latter being a word that now receives attention in health and science textbooks whenever tooth decay is discussed.

Knowing that /v/ in final position is always recorded by ve should have helped the subjects know that judkeeve is not a three-syllable word; yet "jŭd-kē-vē" was the typical, incorrect pronunciation.

Reasons why the other words in the group of 14 were mispronounced so often can be explained briefly because of shared problems. Many subjects (1) did not seem to know what to do with y except when it occurred at the beginning of a word or at the end of a multisyllabic word; (2) failed to deal with digraphs as units; (3) had trouble with r-controlled vowel sounds; and (4) did not know what to do with x when it appeared in initial position. Relatively few problems occurred when x was obviously in final position, as it is in dowx. Although it also is in final position in cuxot (cux ot), knowing that requires the ability to divide cuxot into syllables. The sample mispronunciations for cuxot shown below indicate problems with syllabication, thus with x

cōō ŏxt cŭ zŏt cōō tŏx cŏxt cŭ ŏx cū shŏt cū ŏxt

The other common problem that is suggested in transcriptions of the most frequently mispronounced words was the inability to

blend sounds correctly. Evidence of this shortcoming, and of previously mentioned problems with syllabication, digraphs, and r-controlled vowel sounds, can be seen in a few sample errors:

Pseudo Word	Mispronunciations
thorge	thrō orj thrō jē thwarj thrawg thor idge
naubircude	nā ū bē ir kūd now bū ir cŭd
	nă brī cŭd nă bī er cūd nau brī kūd
thoipder	thō pī der thō perd thor per thŏp der
ciftaung	kĭf tong clĭf tang sĭf thang

Subjects' Explanations for Pronunciations

As was mentioned, subjects were questioned about why they pronounced preselected words as they did. In each case they were asked, "Why do you think it says that? How did you decide it says _____?" The content and number of subsequent questions depended on the response to the first two and on the nature of the word being discussed. Of special interest was why the subjects divided a word into syllables in the way that was suggested in their pronunciation, and why they assigned the sounds they did to vowel letters and to consonants that have variant sounds. These aspects of their decoding efforts were of interest because it is believed that an effective instructional program for phonics enables students to cope with them successfully. Because of space limitations, the guideline used

to select explanations that would be quoted in this report was to focus on the words that, up until now, have received less explicit attention than others in the group of 12 words about which the subjects were queried. Those words are gysan, tylm, vipho, ximdle, and yanse.

Before reporting some of the explanations, two points need to be made. The first is the recognition that even the most successful decoders may not be able to verbalize what they know and can do. It is even possible that the successful ones are least able to explain what they do because it is done automatically, or at least with relatively few conscious decisions. It was hoped, nonetheless, that questions about pronunciations might elicit information that would be relevant for improving phonics instruction.

The second point is that at least some of the explanations offered by subjects may have been after-the-fact attempts to justify a pronunciation rather than a description of what they thought about and decided as they attempted to decode a word. This possibility means that what are called explanations may at times be something else.

Gysan. Two of the common decoding problems discussed earlier apply to gysan, which helps explain why 88% of the total group of subjects mispronounced it. One problem was the persistent tendency to associate g only with /k/, even though g followed by y consistently stands for /j/. The second problem

was uncertainty about what to do with y whenever it occurred anyplace except at the beginning of a word (yanse) or at the end of a multisyllabic word (rincy).

Interestingly, explanations given by the relatively few subjects who pronounced gysan correctly did not always fit the pronunciation. To illustrate:

Grade	Explanation[5]
3	The y in it makes it sound like "ji." Y has the sound "yuh."
4	Gy is like the start of gypsy. San is like sun. The a is sort of short, sort of long, sort of like half a sound."[6]

Some mispronunciations of gysan and the explanations offered for them follow. Examples begin with mispronunciations in which the correct sound was assigned to g since that was uncommon.

Grade	Mispronunciation	Explanation
3	ji săn	Gy is like gypsy. San sounds like "san." It would be "sand" with a d. I divided between y and s because I can just tell where to divide.
3	jĭp sē ŭn	Gy is like gypsy, so I just guessed. The end is just "san." I divided between y and s because it looked like two separate words.
4	jĭ sŭn	I got part of it from gypsy, and then "san." Gypsy is one of our spelling words this week.
4	jĭn săn	Y has the "yuh" sound. It's a consonant. That's why I divided between the y and s.

3	gāz	G and y have a sound like "gā." It's a one syllable word.
4	gī săn	The y sounds like a long i because of the a. It has two syllables split into "gī" and "săn."
6	gī săn	I know that the sound of gy is "gi." I divided it between the y and s, but I don't know why.
6	ī săn	I know that y has the i sound. I don't know if it's long or short.

As can be seen in the explanations listed above, recollections of gypsy to help with gysan were common and suggest the subjects' failure to consider syllabication first. Had the spelling of gysan been used to sort out its syllables (gy san), it would have been seen that the initial syllables in gypsy and gysan represent different spelling patterns, thus different sounds for y.

Tylm. While knowing gypsy should have helped with tylm, it was never mentioned, probably because the subjects attended more to individual letters than to patterns of letters. Other words that might have been known and that would have helped with tylm (e.g., gym, myth, hymn) were not referred to either.

Explanations for correct pronunciations of tylm were not always as good as the pronunciations. For example:

Grade	Explanation
3	The y has the sound of short i. It's one syllable because it has only four letters.
4	I really just guessed. Y is short.
4	Y is short i but I don't know why.
6	Y has the sound of short i because of the t.

Almost without exception, the incorrect pronunciation for tylm was "tī lĕm." Two explanations at each grade level for this mispronunciation follow:

Grade	Explanation
3	It has a long y.
3	It has two syllables, split between the y and l. If you divided after the first letter, it wouldn't make sense. Y sounds like "wuh."
4	Ty is like toy if you take out the o and put the t and y together. Lm is like limb. It sort of sounds like that. It's a two syllable word.
4	Y has the long sound. This is a two syllable word, divided between y and l.
6	You divide between y and l. I know that y should have the i sound because it's between two consonants.
6	The y sounds like an i, the long i because it sounds better.

More unique responses to tylm include the following:

Grade	Mispronunciation	Explanation
3	trā lē ŭm	It just looks like it. It has two syllables, divided between l and m.

4	twī lĕm	It's a one syllable word.
6	tīme	L can be silent in some words, and I think it would be in this word. The sound of y is long i.

Vipho. Another word for which explanations for pronunciations were requested was vipho, which was pronounced correctly by 30.4% of the third graders, 31.3% of the fourth graders, and 42.4% of the sixth graders.

Explanations for a correct response ("vī phō" or "vĭ phō") were unusually brief, thus incomplete, and sometimes incorrect. For example:

Grade	Explanation
4	Vi is "vī" because it has an o at the end, and ph is an f.
4	Ph has the f sound.
6	I couldn't decide whether it was "vĭp hō" or "vī phō." The ph sounds like f.

Some erroneous responses and the explanations for them follow:

Grade	Mispronunciation	Explanation
3	vĭp hō	That's a short i because of the o, so that's "vĭp," and then the ph sounds kind of like an f, so it says vĭp hō.
4	vĭp hō	The v, i, p says "vĭp," and the h, o say "hō."
4	vĭp pō	v, i, p says "vĭp" and p, o says "pō"
4	yī phō	You split it between the p and the h. V, i, p spells "yĭp" and h, o spells hō.
6	vō	The o is long, and the ph is silent.

Responses to vipho, like many of the responses to tylm, provide further evidence for the contention that subjects often failed to scan the whole of a word, sort out syllables with the help of letters and their sequence, and then consider letter-sound correspondences syllable by syllable. The most common mispronunciation for vipho (v̆ip h̄o) also suggested what erroneous responses to other test items often pointed to: the practice of looking for pronouncible parts in a word even though not all of what was pronounced was in the same syllable. This is like the questionable practice--sometimes encouraged by teachers--of looking randomly for little words in big words in order to get the latter identified.

Yanse. That pronouncible parts in yanse may have been sought by some subjects is suggested by the fact that the total group of subjects either pronounced it correctly (56%) or responded to this monosyllabic word with "y̆an s̄e." It would be interesting to know if the subjects who said "y̆an s̄e" could identify real words having the same spelling pattern--words like sense, judge, prince, and solve. If they could, it suggests the need to make patterns explicit for students, since it cannot be assumed that knowing words like sense and judge automatically results in an understanding of the implications of the VCCe pattern for pronunciations.

Some of the explanations for correct responses to yanse include the following, all offered by sixth graders. Third and fourth graders who

responded correctly either said nothing when asked why they thought it was pronounced the way they had suggested, or stated, "I don't know."

Explanations for Correct Pronunciations

Yan has the short sound and the e is silent.

Yan makes a short sound.

Se is like dance, so it's "yăns."

It reminded me of dance. It just looks like it would be pronounced that way.

The two consonants before the e make the a short.

One explanation at each grade level for the incorrect response "yăn sē" follow:

Grade	Explanations
3	It has two syllables, but I don't know why.
4	If it was spelled y,a,n,c,e it would be "yăns." With s, it's "yăn sē."
6	The yan is kind of like candy, so you just put y in front of it.

Highest Achievers on Pseudo Word Test

Since the words about which examiners asked questions turned out to be the most troublesome, the foregoing discussion of responses and reasons cited for them painted a negative picture. With the hope of painting if not a positive picture then at least a balanced one, Table 12 was prepared to provide test data for the 25 subjects who achieved a score of 20 or higher--20 was chosen arbitrarily--on the 29-item test. This group is composed

of four third graders (7% of all the third graders), seven fourth graders (11% of all the fourth graders), and 14 sixth graders (22% of all the sixth graders).

Insert Table 12 about here.

As Table 12 indicates, the most successful subjects were noticeably different from the others in their ability to decode judkeeve correctly. The specific difference was a two- rather than a three-syllable pronunciation. Based on explanations for the pronunciations of 12 words--including judkeeve--this more successful group knew more about syllabicating unknown words than did the others.

Another obvious difference was the success of the better decoders with cef. Repeatedly, they explained the correct assignment of /s/ to c with a reference to the occurrence of this sound when c is followed by e. Once again, this exemplifies a trait of the better decoders: they were more proficient than the others in verbalizing relevant generalizations when asked to explain a pronunciation. This had not been anticipated because of the assumption that the best of decoders achieve pronunciations so quickly that it might be difficult to put into words what was thought about and done. It is possible, of course, that a different pattern would have been found had the test been timed.

The success of the best decoders with cef is likely to raise a question about what is also shown in Table 12: problems with ciftaung and cuxot. With ciftaung, 4 of the 9 errors were mispronunciations not of c but of the digraph au. With cuxot, the consistent source of difficulty was x.

All the other words that were missed fairly frequently by the most successful decoders caused problems for reasons that pertain to all the subjects, thus have already been identified:

- Regardless of what letter followed g in a syllable, it was pronounced /g/.

- Confusion existed about what to do with y when it did not occur at the beginning or end of a word, and with x when it occurred anywhere except at the end of a word.

Some Conclusions

Drawing defensible conclusions from the study is impeded not so much by what was done as by what was not done. The major omission, of course, is classroom observations since they would allow for factual information about the content and the methodology of the phonics instruction received by the 184 subjects. The fact that problems with certain letters and letter combinations occurred repeatedly at the three grade levels studied does tempt one to conclude that more phonics should have been taught; however, visits to classrooms in connection with other research (Durkin, 1974-75, 1978-79, 1983b) have shown repeatedly that much time is already being spent on phonics, sometimes as early as kindergarten. That being the case, it is likely that better phonics instruction is called for, not more.

Although not everyone is likely to agree, it is the opinion of this writer that better phonics instruction would ensure that three deficiencies identified in the present study would be replaced by something better. The first deficiency has to do with what seemed like a disorganized, hit or miss approach taken by many of the subjects as they attempted to work out pronunciations. Evidence that they had been taught to scan the whole of a word before considering its parts was slim. Often missing, then, was a strategy for achieving pronunciations that was both systematic and correct.

Related to the absence of such a strategy was what seemed like a disregard for, or a lack of understanding of, the significance of syllabication for decoding. As the earlier description of subjects' pronunciations and explanations make clear, problems with pronunciations often stemmed from problems with syllabication, especially when attempts were made to use recognizable parts of words even when they were in different syllables.

The same pronunciations and explanations also suggest problems with blending sounds to produce syllables or words. In some instances, these problems were so great that subjects' efforts to synthesize sounds resulted in such unusual pronunciations that it was almost impossible to record them.

Together, both the specific problems with certain letters and the more general ones with syllabication and blending should

at least suggest—especially if similar deficiencies characterize the decoding behavior of other elementary school students--that the large amounts of time now being spent on phonics need to be made more productive. The same data also support a point that was made at the start of this report, namely, that the very apparent switch in research interests from phonics to comprehension was not prompted by evidence that decoding ability among elementary school students is an accomplished fact. What might be more productive is balance in interests—something that the profession seems rarely able to achieve.

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Footnotes

[1]In this paper, decoding refers to the use of spellings to arrive at the pronunciations of unknown words.

[2]Decoding strategies for dealing with irregularly spelled words are described in two citations in references at the end of this report (Durkin, 1983a, 1981b).

[3]To be kept in mind is the ceiling effect on correlation coefficients of the high raw scores achieved by two fourth graders and six sixth graders in School B.

[4]What the researchers should also have pointed out is the reliability (or utility) of the generalization about the times when c will record /k/ and when it will stand for /s/. The consistency for c (but not for g) makes it reasonable to expect fewer errors than were found in that study and in the present one.

[5]What is cited throughout this section as an explanation includes in every case all the information that was elicited with various numbers of questions.

[6]Asked if he was referring to the schwa sound, the subject looked puzzled and said nothing.

[7]This explanation was given repeatedly at all grade levels for the pronunciation "ti lem." Why lm was pronounced "lem" could not be, or at least was not explained by any subject who said "ti lem."

Table 1

Content Used to Develop Pseudo Words

SYLLABICATION	Examples
When a consonant is preceded and followed by vowels, a syllable division often occurs between the first vowel and the consonant.	robot ro bot
When two successive consonants that are not special digraphs are preceded and followed by vowels, a syllabic division generally occurs between them.	window win dow
When a word ends with a consonant followed by le, the three letters form a syllable whose vowel sound is the schwa sound.	gamble gam ble
When x is preceded and followed by vowels, the preceding vowel and x are in one syllable and the vowel that follows it is in another.	exit ex it
VOWEL SOUNDS	
When only one vowel letter is in a syllable and is in final position, it generally stands for its long sound.	me silo
When one vowel letter is in a syllable and is not in final position, it usually stands for its short sound.	met campus
When two vowels that are not special digraphs appear in succession in a syllable, the long sound of the first is common.	eel meat say maintain
When two vowel letters are in a syllable, one of which is final e, and the two are separated by one consonant, the long sound of the first is common.	mete vacate
When two vowels are in a syllable, one of which is final e, and the two are separated by two consonants, the short sound of the first vowel is common.	pledge evolve
Vowel sounds in unstressed syllables are commonly reduced to the schwa sound.	sýmbol aróma condóne

Table 1 (Cont.)

Digraphs		Examples		
Certain pairs of vowels, referred to as "special digraphs," are to be considered one letter recording one sound.				
au	aw	pause		paw
oo		cool	or	cook
ou			out	
ow		owl	or	own
oi	oy	oil		boy

With these digraphs, y and w function as vowels.

Y Functioning as a Vowel

When y is the only vowel in a syllable and does not record the final sound, it stands for /ĭ/.	gym syntax
When y occurs in final position in a polysyllabic word and is preceded by a consonant, it usually stands for /ē/.	hurry plenty
Otherwise, when y is functioning as a vowel, it stands for /ī/. (Y functions as a vowel except when it occurs in initial position, as in yes and beyond.)	rhyme dynamo asylum

R-Controlled Vowel Sounds

When a vowel is followed in a syllable by r, the vowel plus r stand for various blends. The most common one is in final position in her.	dollar her dirt word hurt
The pair ar may record two other blends.	car war
The blend in final position in war is usually represented by or.	for
When a vowel is followed in a syllable by re, other blends are common.	dare here fire more cure

Table 1 (Cont.)

CONSONANT SOUNDS	Examples		
When c or g are followed by e, i, or y, they often record their soft sounds.	cent gem	cite gin	cynic gym
Otherwise, c and g commonly stand for their hard sounds.	can gum	scar glad	sac wig
The letter s stands for both /s/ and /z/. In initial position, the sound is /s/.	son	bus	has

Digraphs

Certain pairs of consonants, referred to as "special digraphs," are to be considered one letter recording one sound.

th	the		thin
sh		shop	
ch	chop	chef	chord
ph		phone	
ng		length	

Q plus u should be viewed as one consonant letter that stands for /kw/ or /k/. The blend /kw/ occurs most often in initial position, whereas /k/ occurs most often in final position.	queen	clique
The letter x stands for /z/ in initial position. Otherwise it stands for the blends /gz/ or /ks/.	xylem	exile sox
The remaining consonant letters (b,d,f,h, j,k,l,m,n,p,r,v,w,y,z) are fairly consistent in the sounds they record.	boy, day, fall, him, job, kite, long, me, no, put, run, van, we, yes, zoo	

Table 2

Acceptable Responses to the Twenty-Nine Pseudo Words

	Word	Acceptable Response(s)		Word	Acceptable Response(s)
1.	rincy	rĭn sē	16.	cef	sĕf
2.	flure	rhymes with lure	17.	dilque	dĭlk
3.	ximdle	zĭm dəl	18.	thorge	thorj or thirj
4.	zalnire	zăl nīrə	19.	gavvore	găv vŏr (or ōr)
5.	dowx	douks or dŏks	20.	quawz	kwawz
6.	naubircude	nau bir kūdə (or kŏŏd)	21.	plere	rhymes with here
7.	gysan	jī săn (or zăn)	22.	vipho	vī (or vĭ) fō*
8.	yanse	rhymes with dance	23.	wobe	rhymes with robe
9.	shigur	shī (or shĭ) gur*	24.	chaylar	chā lar (or ler)
10.	cuxot	kŭks (or kŭgz) ŏt	25.	jownare	jou (or jō) nare (rhymes with pare)
11.	tylm	rhymes with film	26.	gebthor	jĕb thor (or ther)
12.	judkeeve	jŭd kēv	27.	hoyk	hoik
13.	gik	jĭk	28.	ciftaung	sĭf tong (rhymes with song)
14.	arfeaple	ar fē pəl	29.	thoipder	thoip der
15.	voog	vŏŏg or vŏŏg			

*Some instructional materials teach that in words with the VCV pattern, the vowel preceding the consonant may stand for its short sound (lemon) even though it is a single vowel in a syllable (le) and is in final position. This writer's recommendation to teachers is to instruct children to try the long sound first (spider, cupid, baby) but that if it fails to suggest a recognizable word, they should next try the short sound (lizard, melon, acid). For the research, "shi-gur" and "vi-fo" were accepted as correct responses to shigur and vipho respectively. If subjects said "shĭ-gur" or "vĭ-fŏ," they were asked, "Might there be another way to say that word?" If they then offered "shī-gur" or "vī-phō"--and this occurred frequently--their response was considered to be correct. If they did not offer the second pronunciation for the initial syllable, the response was marked incorrect.

Table 3

Scores on 29-Item Pseudo Word Test

Subjects	Mean Score	Standard Deviation	Range of Scores
Total Group (N = 184)	12.2	6.0	0-26
Girls (N = 89)	12.1	5.8	1-26
Boys (N = 95)	12.3	6.1	0-25

Table 4

Percent of Correct Responses to Each Pseudo Word

Total Group of Subjects (N = 184)

Word	Percent of Correct Responses	Word	Percent of Correct Responses
1. wobe	82.1	16. zalnire	43.5
2. rincy	75.5	17. vipho	34.8
3. voog	74.5	18. cef	34.2
4. shigur	64.1	19. thorge	31.0
5. chaylar	62.0	20. naubircude	30.4
6. dowx	60.9	21. thoipder	27.7
7. gavvore	57.6	22. ciftaung	25.5
8. flure	56.0	23. cuxot	25.5
9. arfeaple	54.3	24. tylm	23.4
10. plere	52.7	25. gebthor	22.3
11. jownare	51.1	26. ximdle	15.8
12. hoyk	47.3	27. dilque	12.5
13. judkeeve	47.3	28. gik	12.5
14. yanse	44.0	29. gysan	12.0
15. quawz	43.5		

Table 5

Scores on 29-Item Pseudo Word Test

by Grade Level

Subjects	Mean Score	Standard Deviation	Range of Scores
Third Graders (N = 56)	9.3	5.6	0-21
Fourth Graders (N = 64)	12.2	5.5	3-25
Sixth Graders (N = 64)	14.9	5.5	5-26

Table 6

Percent of Correct Responses to Each Pseudo Word by Grade Level

Word	Grade 3 (N = 56)	Grade 4 (N = 64)	Grade 6 (N = 64)
wobe	76.8	79.7	89.1
rincy	58.9	79.7	85.9
voog	58.9	79.7	82.8
flure	57.1	50.0	60.9
shigur	55.4	60.9	75.0
chaylar	51.8	70.3	62.5
gavvore	50.0	46.9	75.0
judkeeve	48.2	43.8	50.0
plere	44.6	45.3	67.2
dowx	42.9	62.5	75.0
jownare	37.5	59.4	54.7
hoyk	35.7	43.8	60.9
arfeaple	32.1	64.1	64.1
thorge	30.4	28.1	34.4
vipho	30.4	31.3	42.2
quawz	28.6	42.2	57.8
yanse	28.6	48.4	53.1
zalnire	26.8	45.3	56.3
cuxot	21.4	21.9	32.8
naubircude	19.6	26.6	43.8
cef	16.1	34.4	50.0
ciftaung	12.5	25.0	37.5
thoipder	10.7	28.1	42.2
tylm	10.7	23.4	34.4
ximdle	10.7	12.5	23.4
gebthor	8.9	23.4	32.8
gik	8.9	20.3	7.8
dilque	5.4	14.1	17.2
gysan	5.4	9.4	20.3

Table 7

Scores in March on Standardized Achievement Test: Reading Section

School A

Subjects	Raw Scores			Grade-Equivalent Scores		
	Mean	Stand. Dev.	Range	Mean	Stand. Dev.	Range
Total Group (N = 68)	57.7	17.2	20-84	6.1	2.4	1.9-11.9
Third Graders (N = 23)	56.4	17.7	20-78	4.5	1.4	1.9-7.4
Fourth Graders (N = 26)	54.4	16.0	26-83	6.3	2.1	3.2-11.9
Sixth Graders (N = 19)	63.7	17.6	23-84	7.9	2.6	2.8-11.9

Table 8

Scores in April on Standardized Achievement Test: Reading Section

School B

Subjects	Raw Scores			Grade-Equivalent Scores		
	Mean	Stand. Dev.	Range	Mean	Stand. Dev.	Range
Total Group	94.4	15.1	38-117	7.4	2.8	2.7-12.9
Third Graders	93.2	11.3	59-109	5.9	2.2	2.7-11.2
Fourth Graders	90.0	20.0	38-117	6.8	2.5	2.7-11.8
Sixth Graders	99.1	10.6	74-113	9.4	2.3	5.5-12.9

Table 9

Performance on Twenty-Nine Item Pseudo Word Test

Test Data	School A				School B			
	Third Graders (N=23)	Fourth Graders (N=26)	Sixth Graders (N=19)	Total Group (N=68)	Third Graders (N=33)	Fourth Graders (N=38)	Sixth Graders (N=45)	Total Group (N=116)
Mean Score	10.7	11.9	13.5	11.9	8.3	12.4	15.4	12.4
Standard Deviation	5.9	4.7	5.2	5.3	5.3	6.1	5.6	6.4
Range of Scores	0-21	4-22	5-23	0-23	1-21	3-25	6-26	1-26

Table 10

Subjects' Responses to Pseudo Word Test

School A (Subjects = 68)			School B (Subjects = 116)		
Percent Correct	Rank	Word	Percent Correct	Rank	Word
82.4	1.0	wobe	81.9	1.0	wobe
80.9	2.0	rincy	73.3	2.0	voog
76.5	3.0	voog	72.4	3.0	rincy
63.2	4.5	chaylar	70.7	4.0	shigur
63.2	4.5	dowx	62.1	5.0	gavvore
60.3	6.0	flure	61.2	6.0	chaylar
57.4	7.5	arfeaple	59.5	7.0	dowx
57.4	7.5	jownare	55.2	8.0	plere
52.9	9.5	shigur	53.4	9.0	flure
52.9	9.5	yanse	52.6	10.0	arfeaple
50.0	11.0	gavvore	50.9	11.0	hoyk
48.5	12.0	plere	49.1	12.5	judkeeve
44.1	13.0	judkeeve	49.1	12.5	quawz
41.2	14.5	hoyk	47.4	14.0	jownare
41.2	14.5	zalnire	44.8	15.0	zalnire
33.8	16.0	quawz	38.8	16.0	yanse
32.4	17.0	thorge	37.1	17.0	vipho
30.9	19.0	cef	36.2	18.0	cef
30.9	19.0	cuxot	31.9	19.5	naubircude
30.9	19.0	vipho	31.9	19.5	thoipder
27.9	21.0	naubircude	30.2	21.0	thorge
22.1	22.5	ciftaung	27.6	22.0	ciftaung
22.1	22.5	gebthor	26.7	23.0	tylm
20.6	24.0	thoipder	22.4	24.5	cuxot
19.1	25.0	gik	22.4	24.5	gebthor
17.6	26.0	tylm	16.4	26.0	ximdle
14.7	27.0	ximdle	14.7	27.0	gysan
11.8	28.0	dilque	12.9	28.0	dilque
7.4	29.0	gysan	8.6	29.0	gik

Table 11

Correlation Coefficients for Pseudo Word

Test Scores and Raw Scores from Standardized Reading Tests

	Pseudo Word Test and Reading Test	Pseudo Word Test and Comprehension Subtest	Pseudo Word Test and Vocabulary Subtest	Pseudo Word Test and Word Study Subtest
SCHOOL A				
Grade 3	.45*	.43*	.45*	
Grade 4	.63***	.53**	.69***	
Grade 6	.62**	.67***	.51*	
SCHOOL B				
Grade 3	.31*	.09		.46**
Grade 4	.60***	.53***		.57***
Grade 6	.58***	.46***		.55***

*p < .05, one-tailed test

**p < .01, one-tailed test

***p < .001, one-tailed test

Table 12

Number of Correct Responses by Subjects (N = 25)

Achieving Pseudo Word Test Score of Twenty or Higher

Word	No. of Correct Responses	Word	No. of Correct Responses
rincy	25	jownare	20
voog	24	flure	20
judkeeve*	24	yanse*	17
dowx	24	vipho*	17
zalnire	23	thorge*	17
wobe	23	tylm*	16
shigur	23	cuxot*	16
gavvore	23	naubircude*	16
chaylar	23	ciftaung	16
cef*	23	ximdle*	14
arfeaple	23	gebthor	12
thoipder	22	dilque*	10
quawz	22	gysan*	9
hoyk	22	gik*	2
plere	20		

*Words with asterisks are the 12 about which questions were asked.

**Underlined words are those that were mispronounced 50 percent of the time or more by the total group of subjects (N = 184) and at each of the three grade levels.

Mean Scores on Twenty-Nine Item Pseudo Word Test